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to observe that too large a part of it does not show anything except that the writers were ignorant of the literature. Even their interest is shown to be fraudulent. They expect us to take an interest in their writings, when they do not care enough for the subject to read what has been written by others.

CHARLES ROBERTSON.

Propagation of mosses.

DR. CARL CORRENS has been at work for five years upon the vegetative reproduction of the true mosses. In that time he has published several preliminary papers on his researches,[2] and an important collateral paper "Ueber Scheitelwachsthum, Blattstellung, und Astanlagen des Laubmoosstämmchen" in the *Festschrift für Schwendener* (1899). These investigations are now brought together *in extenso* to form a bulky volume of almost 500 pages.[3]

The gametophyte of mosses propagates itself by many methods and by brood-bodies which arise from protonema, or rhizoid, or stem, or leaf. The sporophyte produces normally no propagative organs except the spores. The homology of the brood-bodies of Georgia (with which the researches of Correns began in 1894), Œdipodium, Drepanophyllum, and a few others (all of possible paraphysine nature) remain undetermined. The term brood-organs is restricted to those structures of which propagation is the chief or the coördinate function. The term cuttings is applied to those parts artificially separated by which propagation is possible. The brood-organs of one hundred and twenty-five species are monographically described. Forty species which can be reproduced from cuttings are also elaborately treated.

The terms applied to the brood-bodies have such resemblance in form and sound in German that they must prove objectionable, particularly in speaking. *Bruchstämmchen* or *Bruchäste* are stems or branches which are brittle throughout and may break off anywhere, or even break up into pieces, each capable of growth. *Brutäste* are brittle at base only where a separation layer is formed. *Bruchknospen* are branches brittle only beneath the apex, while *Brutknospen* are short *Brutäste.* In such a case perhaps it is unimportant whether one perceives the distinction between *Bruch* and *Brut!* In the same way we have *Bruchblätter* and *Brutblätter.* *Bulbillen* are defined as *Brutknospen* with reduced leaves, but the organs described as bulbils in *Leptobryum pyriforme* bear not the slightest trace of leaf rudiments; indeed they are elsewhere called "root tubercles."

In the general part (pp. 325–460) Dr. Correns discusses the morphology and phylogeny of the brood-bodies arising on stem, leaves, and protonema.

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[2] Berichte d. deutsch. bot. Gesells. **13**: 420. 1895; **14**: 94. 1896; **15**: 373. 1897; **16**: 22. 1898.

[3] CORRENS, CARL: Untersuchungen über die Vermehrung der Laubmoose durch Brutorgane und Stecklinge. 8vo. pp. xxiv+472. *figs. 185.* Jena: Gustav Fischer. 1899. *M* 15.

He rejects Schimper's view that the cluster of gemmæ in Georgia and Œdipodium is homologous with a male "flower," the gemmæ being sterilized antheridia; and also dismisses as improbable Brefeld's suggestion that they are sterile sporangia, like chlamydospores.

The structure and development of the brood-bodies, their separation, distribution, mode and conditions of germination, and the conditions for their formation are described. Finally the author furnishes a key to the various kinds of brood organs and the species in which they occur.

A list of the literature, which consists mainly of the systematic works referred to, the special literature being very scanty, and an inadequate index complete the work.

The interest and value of the book lie in the exhaustive treatment of a subject, presumably narrow, which has shown itself broad when thoroughly studied. It would be interesting to have a similar study of the vegetative reproduction among the Hepaticæ, and we trust Dr. Correns will include in this thorough investigation both classes of the Bryophyta.—C. R. B.

NOTES FOR STUDENTS

VÖCHTING, the author of the well-known work on Transplantation and of various papers having to do with the correlations of organs and tissues, has published the results of some extended investigations on tuberous plants.[4] It is essentially, as he terms it, a study of the vicarious organs of these plants, and is a continuation and extension of a line of work begun long ago. The power of one organ to perform the function of another in case of need has long been known, and many instances of this phenomenon have been summarized by Hertwig among animals and by Goebel and Vöchting among plants. As long ago as 1803 Knight grafted the stem of a grape vine upon a petiole, and the latter organ developed woody tissue as a result. The author himself showed in previous studies that a potato tuber may be inserted into the stem and caused to develop mechanical and conductive tissues, and that the suppression of the tubers of the artichoke is followed by a swelling of other organs to take their place. In the above cases the replacing organ is essentially the same in kind as that replaced, but Vöchting now shows that almost any organ, if properly stimulated, may become a tuber. He defines a tuber as a fleshy body used for storage, whether morphologically stem, root, or leaf —a definition that the following results obviously require.

The experiments upon vicarious organs arrange themselves into two groups: a tuber may replace a stem when put in such a position that its normal function cannot be performed, or a tuber may be developed from almost any organ if the normal formation of tubers is suppressed. One of the most plastic plants studied was *Oxalis crassicaulis*, a plant which normally

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[4] Prings. Jahrb. für wiss. Bot. **34**: 1–148. 1899.